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Standardization of a process for development of onion paste

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Abstract
A technology for onion paste was prepared form two onion varieties of Bhima Super and Agrifound Light Red. Effect of chemical preservatives was also studied on quality characteristics of onion paste. Onion paste was prepared by using various concentrations of salt (0.5 to 1.5%), palm oil (5 to 15%), citric acid (0.1 to 0.3%) and sodium meta bi sulfate (0.1 and 0.3%). Results showed that onion paste treated with concentration of 0.3% citric acid and 0.3% sodium meta bi sulphite were found as a best preservatives for Bhima super variety of onion.

Keywords: Onion paste, bhima super, agrifound light red and preservative

Introduction
Onion is known to have been in cultivation since ancient times. It is probably a native of Asia originating from Northwest India, Baluchistan and Afghanistan. Onion has acquired its name from the city built by Qnia in 170 BC near the Gulf of Suez (Krishnamurthy *et al*., 1987) [8]. Onion belongs to the family Alliaceae, genus Allium. Onion (*Allium cepa* L.) forms an important part of most of culinary preparation, cultivated mainly in the tropical countries since long time. Production of onions is widely practiced across the globe with an estimated 9.2 million acres under the crop. The world top leading producer of onions is China. The country produces over 20 million tones of onions annually. India is the 2nd largest producer of onions with an estimated 8,178,300 tonnes produced annually. Maharashtra is the major Onion producing State with 29.55% of production share, followed by Madhya Pradesh, Karnataka, Rajasthan and Andhra Pradesh with 16.97%, 11.63%, 6.57%, and 4.89% share, respectively (Source: State Departments of Horticulture & Agriculture, 2015) [6].
Onion (per 100g of onion) is having moisture 86.6g, protein 1.2g, fat 0.1g, fiber 0.6g, calcium 46.9 mg, minerals 0.4g, vitamin C 11.0 mg (Mitra *et al*., 2012) [9]. Onions compared with other fresh vegetable are relatively high in food energy, intermediate in protein content and rich in calcium and riboflavin. Besides imparting a characteristic taste and flavour to food, it also has significant therapeutic values. Due to high nutritional and mediational quality, onion is used as an appetizer, food digester and health promoter. Even today people from the villages eat onions and jaggery (gur) with water to overcome fatigue and exhaustion after a long walking. Onions have a wide range of beneficial properties for human health, such as anticholesterolemic, anti-mutagenic, and antioxidant activity (Skerget *et al*., 2009) [14]. Recently, an increasing attention has been paid to the antioxidant content of onion because, epidemiological studies have indicated that regular consumption of onions is associated with a reduced risk of neurodegenerative disorders, many forms of cancer and cataract formation. Hence, the present investigation was undertaken to standardize the process for development of onion paste and to evaluate physico-chemical properties of the prepared product.

Materials and Methods
Raw Materials
Bhima Super and Agrifound Light Red Varieties of onion were procured from Horticulture Farm, JNKVV, Jabalpur, MP, India. Analytical grade chemicals were used for analysis, which were available in laboratory of Food Science Department.

Preparation of onion paste

Matured and graded onion bulbs of both varieties were manually selected and cleaned by removing the outer skin and roots with the help of knife. Then, they were chopped and passed through hammer for fine onion paste. Onion paste of each variety was divided into lots for mixing of various preservatives in different ratio.

Table 1: Addition of different preservatives in different proportion in each variety

Preservatives	Levels		
	-1	0	+1
Common Salt, %	0.5	1.0	1.5
Palm Oil, %	5	10	15
Citric Acid, %	0.1	0.2	0.3
Sodium meta bisulfate, %	0.1	0.2	0.3

Procedures for physico –chemical analysis of Onion paste varieties

Moisture Content

The moisture content of onion paste was determined according to the method of A.O.A.C (1992) [3].

pH

The pH of paste was measured using digital pH meter with glass electrode. The sample was diluted in the ratio of 1:2.

Total soluble solids

The total soluble solids (TSS) of samples were measured at room temperature by Hand refractometer. 20 ^{0}C temperatures was set as a standard.

Vitamin C (Ascorbic acid)

The ascorbic acid content was estimated as per Assay method given by Ranganna (1986) [12].

Anthocyanins and Crude fiber

Anthocyanins and Crude fiber of onion paste was estimated according to the method of A.O.A.C (1980) and A.O.A.C (1992) [2, 3] respectively.

Pyruvic acid

Pyruvic acid of the sample was determined by using standard pyruvic acid method as given by Schwimmer S and Weston WJ (1981) [13].

Acitity

Acitity of onion paste was estimated by simple acid-alkaline titration method as described by Wang *et al*., (1995) [15].

Results and Discussion

Moisture Content

The result indicated that moisture content in Bhima Super variety of onion ranged 86.55% to 86.64% whereas in Agrifound light Red onion var ranged 86.47 to 86.60%, maximum moisture content was found to be 86.64% in 1.5% salt treated Bhima Super onion var. and 86.60% in 1.5% salt treated Agrifound Light Red var whereas minimum was found 86.54% and 86.43% in 15% palm oil treated varieties of onion paste. Moisture content was statistically at par in all treated varieties of onion paste. Processing variables significantly influences the moisture content of onion varieties. Moisture content increased with increases the ratio of preservatives in both varieties of onion paste. This might be due to hygroscopic nature of preservatives. Similar result reported by NHRDF (2009) [10].

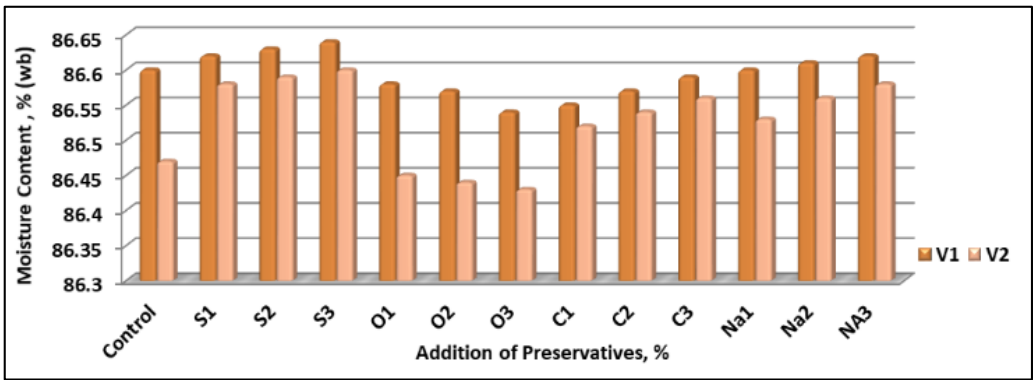

Fig 1: Effect of preservatives on moisture content of onion paste

V1= Bhima Super onion variety, V2= Agrifound light Red onion variety, S1= salt 0.5%, S2= salt 1.0%, S3= salt 1.5%, O1= 5%, O2= 10%, O3= 15%, C1= 0.1%, C2= 0.2%, C3= 0.3%, Na1= 0.1%, Na2= 0.2%, Na3= 0.3%

pH

pH content was ranged from 5.00 to 6.66 in all treated varieties of onion paste. Maximum pH 6.66 and 6.42 was found in control sample of Agrifound Light Red and Bhima Super onion paste where as minimum was found 5.00 and 5.29 in 0.3% citric acid treated Bhima Super and Agrifound Light Red onion paste var. pH content of Na1V1 & Na2V2 and S3V2 & O1V2 & O2V2 and O3V3 were statistically at par with each other. There was significant difference was found in pH of onion paste varieties. pH of onion paste increased with increase the ratio of preservative except citric acid treated onion paste varieties. This might be due to nature of preservatives. Similar finding were reported by USDA (2004) [7].

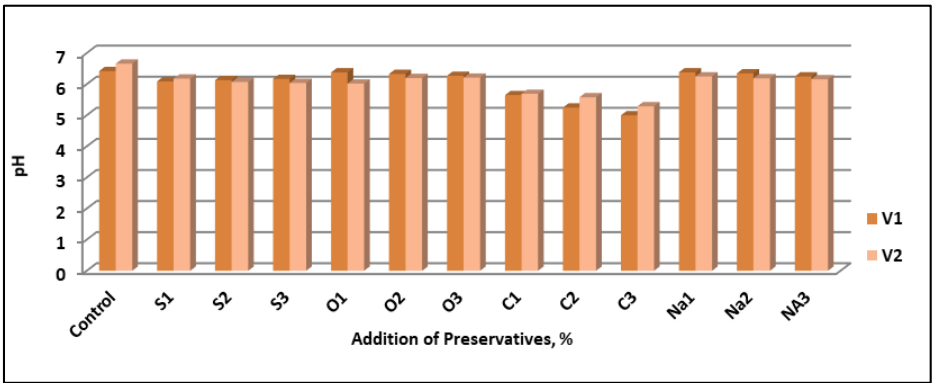

Fig 2: Effect of preservatives on pH of onion paste

Total soluble solids

As evident from Fig 3, the maximum total soluble solids (TSS) was found 13.80 ^{0}Brix in control sample of Bhima Super var onion paste, whereas minimum was found (12.08 ^{0}Brix) in O1V2 5% oil treated onion paste Agrifound Light Red variety. Mean score value of TSS in O1V1& O2V1, O3V1 and C2V1& C3V1, Na2V1 and S1V2, O2V2& O3V2, C1V2& C2V2 samples statistically at par with each other. Salt treated Bhima Super onion paste was significantly superior to other samples. Significant difference was found in treated varieties of onion paste. The decrease in total soluble solids content might be due to addition of preservatives and activity of fermentation. Similar finding reported by Ramadevi *et al*. (2010) [111] changes in quality and chemical parameter of onion bulbs during storage.

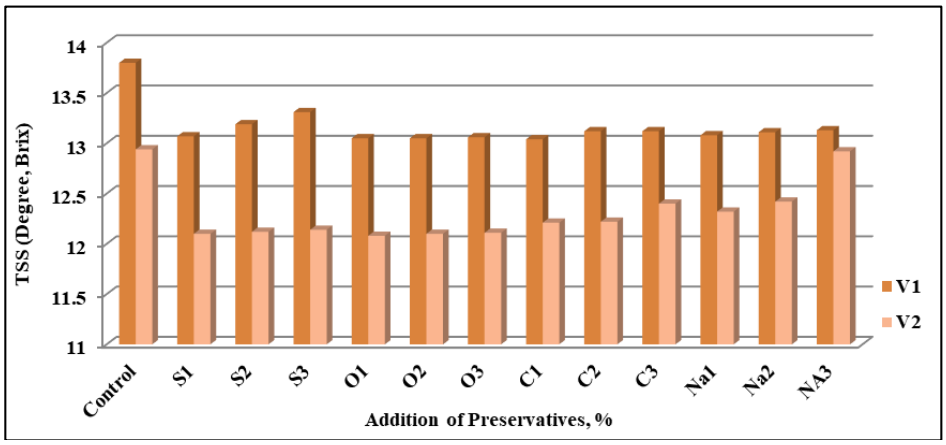

Fig 3: Effect of preservatives on TSS of onion paste

Vitamin C

As the data shown in fig. 4 mean score value of vitamin C content ranged from 62.42 mg/100g to 62.75 mg/100g in Bhima Super onion var. paste where as in onion var. Agrifound Light Red paste was found to be 60.15 mg/100g to 60.98 mg/100g. Maximum Vit C content of 62.75 and 60.98 mg/100g was found in 0.3% citric acid treated Bhima Super and Agrifound Light Red var. paste and minimum Vit C content of 62.42 and 60.15 mg/100g was noticed in 0.5% salt treated Bhima Super and Agrifound Light Red var. onion paste. Mean score value of Vit C in all treated varieties of onion paste samples statically at par with each other. 0.3% citric acid treated Bhima Super variety was significantly superior than other samples. Significant difference was found in Vit C of onion varieties. Ascorbic acid increased with increase the concentration ratio of citric acid preservative in onion paste. Similar result reported by Goudra Pramod Gouda *et al*. (2016) [5].

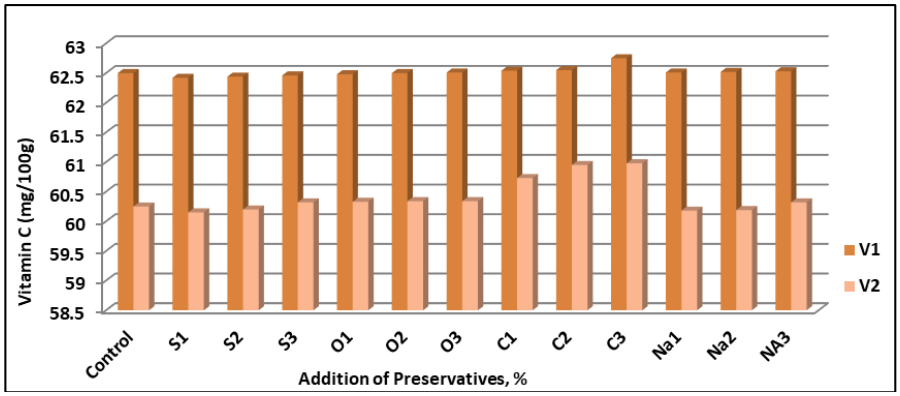

Fig 4: Effect of preservatives on vitaminC of onion paste

Anthocyanins

Anthocyanin content was ranged from 1.11 mg/100g to 1.31 mg/100g in Bhima Super var. onion paste where as in Agrifound Light Red var. onion paste ranged from 1.11 mg/100g to 1.26 mg/100g. Maximum Anthocyanin content was found to be 1.31 mg/100g in 0.3% citric acid treated Bhima Super variety where as minimum was found (1.11 mg/100g) in 0.1% Sodium meta bi sulfite treated Agrifound Light Red var. onion paste. Anthocyanin content was statistically at par in all treatments and varieties of onion paste. However 0.3% citric acid treated Bhima Super var. onion paste significantly superior than other treated onion sample. Significant difference was found in treated varieties of onion paste. All concentration of palm oil decreased the Anthocyanin content in both varieties of onion paste. Similar result reported by Ferreres F *et al*. (1996) [4].

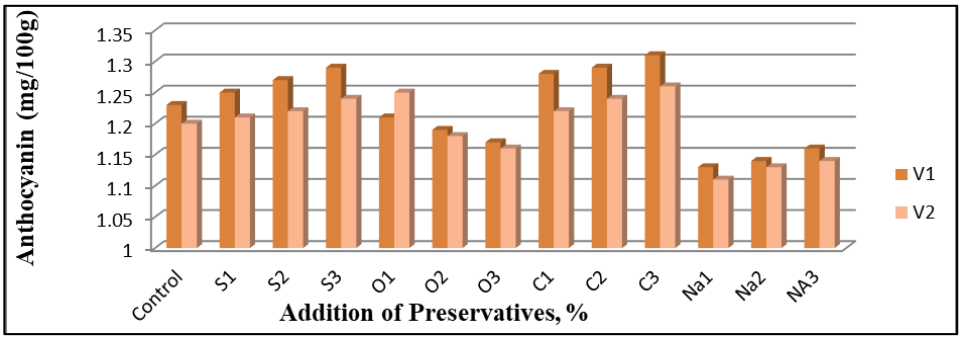

Fig 5: Effect of preservatives on anthocyanin of onion paste

Pyruvic acid

Mean score values of pyruvic acid content of different preservatives treated onion paste varieties varied from 22.02 mg/100g to 43.66 mg/100g. Maximum pyruvic acid content was found 43.66 mg/100g in 0.3% sodium meta bi sulfite treated Bhima Super variety onion paste, whereas minimum was found 22.02 mg/100g in control sample of Agrifound Light Red var onion paste. Pyruvic acid content in S3V1, control sample and Na1V1, Na2v1, Na3V1 and all treated onion paste Agrifound Light Red var statically at par with each other. Sodium meta bi sulfite treated Bhima Super onion var. significantly superior than Agrifound Light Red onion variety. Significant difference was found in pyruvic acid of onion paste varieties. All concentration of preservatives was helpful for increasing the content of pyruvic acid except palm oil treatment in both onion varieties. Similar finding was reported by Yoo *et al*. (2012) [16].

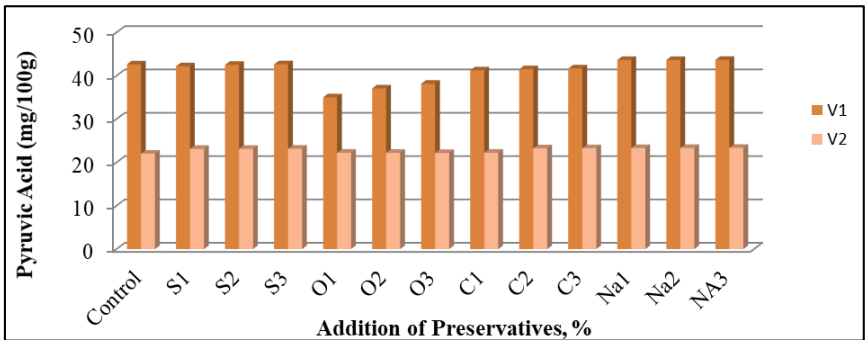

Fig 6: Effect of preservatives on pyruvic acid of onion paste

Crude fiber content

Crude fiber was ranged from 0.53% to 0.59% in both varieties of treated onion paste. Maximum fiber was found in 0.58 & 0.59 % in control sample of Bhima Super and Agrifound Light Red var. paste. Whereas minimum was found 0.53% and 0.54% in 0.3% sodium meta bi sulfite treated onion paste of Bhima Super and Agrifound Light Red var. Crude fiber content statically at par in all treatments and varieties of onion paste. There was non-significant difference was found in treated varieties of onion paste. Similar result was reported by Goudra Pramod Gouda *et al*. (2016) [5].

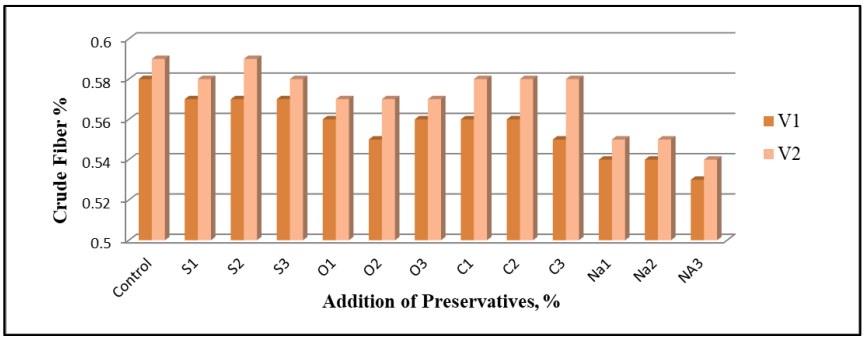

Fig 7: Effect of preservatives on crude fiber of onion paste

Acidity content

As the data shown in fig 8 mean score value of acidity content ranged from 0.25% to 0.50% in Bhima Super onion var. whereas Agrifound Light Red onion var. was 0.26% to 0.55%. Maximum acidity content of 0.55% was found in 0.3% citric acid treated Agrifound Light Red onion var. whereas minimum found to be 0.25% and 0.26% in control and 5% palm oil treated Bhima Super and Agrifound Light Red onion var. There was significant difference was found in treated varieties of onion paste. Acidity content increased in increases the concentration ratio of citric acid similar result was reported by Ahmed & Shivhare (2002) [1].

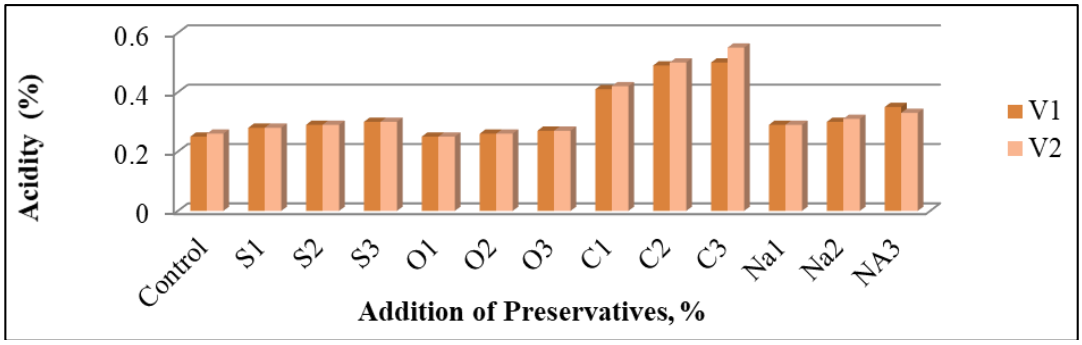

Fig 8: Effect of preservatives on acidity of onion paste

Conclusion

Onion paste was preserved with the use of different concentration of preservatives like salt (0.5 to 1.5%), palm oil (5 to 15%), citric acid (0.1 to 0.3%) and sodium meta bi sulfate (0.1 and 0.3%). It was concluded that onion paste treated with concentration of 0.3% citric acid and 0.3% sodium meta bi sulphite were found as a best preservatives for Bhima super variety of onion. Maximum Anthocyanin content was found to be in 0.3% citric acid treated Bhima Super variety where as minimum was found in 0.1% Sodium meta bi sulfite treated Bhima Super var. onion paste.

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